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Examination of factors influencing employees' adoption of mobile commerce and services in Turkey

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ABSTRACT

This study first reviews and discusses mobile technology issues from a global perspective, and then investigates the impact of demographic (gender, age, income), personal (ICT experience, work experience), and organisational (sector) factors related to employees on adopting mobile commerce (m-commerce) and mobile services (m-services). A survey is conducted among employees from government- and private-sector organisations for this purpose, assuming that this group plays an important role in helping to adopt new technologies in societies. Based on this survey, the results indicate that gender, experience, and sector have an impact on attitude towards using m-technologies and that such attitude has a significant effect on the actual use of m-technologies.

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Mobile commerce; mobile services; demographic factors; personal factors; organizational factors

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1. Introduction

Wireless and Mobile technologies are becoming increasingly available on a global scale and mobile devices are rapidly spreading in everyday life. These technologies have the advantage of being portable, with two major characteristics of mobility and broad reach. They enable users to access the internet with mobile computing devices (PDAs, cellular phones, smartphones, Tablet PC, iPads or laptops) and feel free to move while staying connected to service networks, without needing to find a place to plug in. These applications are emerging because they offer a direct communication between individuals regardless of time and geographical position. The emerging technology behind mobile applications, which is based on the Wireless Application Protocol (WAP), has made far greater strides in Europe than in the United States (Rouse, 2005).

According to Lee and Lee (2007), m-commerce is defined as all types of business transactions using mobile or wireless networks. Ngai and Gunasekaran (2007), referred to m-commerce as 'the conduct of commerce via wireless devices'. The m-services are all the other activities that offer the generic benefits of the use of mobile technology, including mobile communication and information retrieval. Kumar and Zahn (2003) specified mobile services to be content delivery, notification, reporting and communication. Zhou (2011)

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has added mobile search, mobile games, and mobile instant messaging (IM) to this list. According to Kim, Mirusmonov, and Lee (2010), with recent advances in mobile technologies, mobile commerce is having an increasingly profound impact on our daily lives and is beginning to offer interesting and advantageous new services. They analysed the impact of m-payment system characteristics and user-centric factors on m-payment usage across different types of mobile payment users, and suggested new directions for future research in this emerging field. Sim (2012) explored the m-commerce challenges and future directions by evaluating adoption factors. In his article, he outlined the importance of drivers in m-commerce. As for improvements, further surveys and research have been proposed using structural regression analysis to test, validate and enhance the model. In another recent study, He, Wang, and Liu (2012) has pointed out the importance of an exploratory analysis for factors influencing the adoption of mobile applications, and proposed using these factors as independent variables in the analyses.

Adoption of m-services has attracted the interests of researchers in recent years. Zhou (2011) reported that extant research has focused on the initial adoption and usage of mobile services, but paid little attention to the post-adoption and continuance usage, whereas initial adoption reflects the users' first-time usage of mobile services. Zhou (2011) defines post-adoption to reflect usage continuance and repeated usage. According to his study, the user adoption rate of mobile services is relatively lower than expected and it is necessary to identify the factors affecting mobile user adoption and usage behaviour. Mallat, Rossi, Tuunainen, and Anssi Oorni (2009) also studied mobile services acceptance and suggested the need for extending their study to mobile information and entertainment services. Bouwman, Carlsson, Molina-Castillo, and Walden (2007) discussed the importance of understanding the role of barriers and benefits of mobile services. Their analysis shows that understanding actual use is only possible once the characteristics of the involved services are taken into account. They suggested the extensions to include analysis of the impact of socio-demographic factors on mobile services.

According to Dholakia, Bagozzi, and Pearo (2004), adoption and usage of m-commerce and services have been highly variable among countries since 'the adoption of mobile technology does not follow any single universal logic or pattern'. The differences in adoption and usage across different nations may be attributable to differences in the mobile telecommunications infrastructure, the range of mobile services on offer to the marketing strategies utilised by service providers, and the underlying culture of the consumers of mobile services.

Based on the number of findings by Portio Research (2013), mobile subscribers worldwide will reach 6.5 billion by the end of 2012, 6.9 billion by the end of 2013, and 8 billion by the end of 2016. It is also estimated that Asia Pacific's share of the mobile subscribers will rise from 50.7% in 2011 to 54.9% in 2016, by which year Africa and the Middle East will overtake Europe as the second largest region for mobile subscribers. Smith (2012) has found in his research project in the US that 17% of cell phone owners do most of their online browsing on their phone, rather than a computer or other device. He further added that some 88% of the US adults own a cell phone of some kind as of April 2012, and more than half of these cell owners (55%) use their phone to go online. According to WebReports (2007), in Australia, the Internet has brought about the concept of affordable data communications. It was estimated that broadband will create a new economy sector worth $70 billion in revenue by 2015. In the retail market, Telstra ADSL established

about 34% of the market in 2007 and resellers took about 47% of the market. From an infrastructure provider's position, Telstra dominated with a wholesale market share of around 81%, and we predict it to maintain this level of market share over the next few years (WebReports, 2007).

The social interactions regarding mobile applications in the developed world have captured the bulk of the research community's attention to date, and scholarly research on the adoption and socioeconomic impacts of mobile systems in the developing world is scarce (Maurer, 2008). The basic concepts of mobile applications have been developed in the Western World, and most of the relevant studies are either US/EU or Far-East based. In the study by Garbacz and Thompson (2005), the results support the differences between developed and developing country models for mobile service usage. Therefore, these results may not be entirely applicable to developing countries.

Although the number of studies focused on mobile systems in the developing world is growing steadily, the literature around the mobile in the developing world is still relatively new and not mature despite the growing number of mobile users (Donner, 2008). Turkey is a developing, relatively young, and highly populated republic. It is the 17th largest economy in the world and lies between the individualistic and collectivist cultures of Western and Far East countries, respectively (Chirkov, Ryan, & Kim, 2003). Although a number of studies related to mobile technologies have been conducted in that country, the factors influencing adoption of mobile applications have not been studied in the context proposed by the authors of this paper. Some studies have been reported on various issues of m-technologies in Turkey, such as 'The analysis of antecedents of customer loyalty in the Turkish mobile telecommunication market' (Aydin & Ozer, 2005), 'Research Note: A Need or a Status Symbol? Use of Cellular Telephones in Turkey' (Ozcan & Koçak, 2003) and 'Analysis of Turkish Mobile Communication Market and Introduction of Mobile Virtual Network Operators' (Boynudelik, 2011). However, these studies do not address the attitudes of individuals towards mobile commerce usage in the society.

The current study was thus undertaken to investigate the factors influencing adoption of mobile applications among some employees of government-sector and private-sector organisations in Turkey with reference to important socio-demographic factors and attitude towards actual usage. The results of this empirical study may be useful for policy makers of companies from public and private sectors for developing effective mobile business and service strategies for their own organisations.

2. Research model and hypotheses

The objective of this paper is to analyse the relationships first between background factors and attitude in mobile technology usage, and then between attitude and actual usage towards mobile technologies. We developed a conceptual framework for this purpose (Figure 1). The background factors involve three groups of characteristics – demographics (gender, age, and income), personal (experience) and organisational (sector of the establishment of respondent).

The variable attitude is a construct from reasons for using mobile activities and the approximate monthly cost of mobile activities, and has an intermediary role in the model. Finally, the actual behaviour towards m-activities is used to extract the impact of attitude.

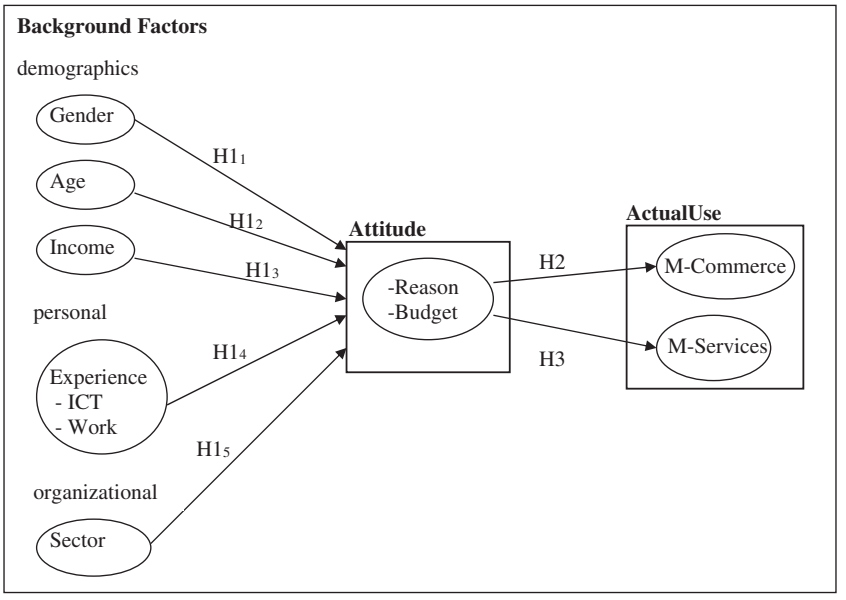

Figure 1. Representation of the standardised model. Circles represent indicators; boxes represent latent factors. The causal effects are given by arrows connecting boxes and circles. Source: authors.

It consists of m-commerce and m-services. Unlike most other researches, this study focuses on the point of view of the professionals since m-technologies are relatively new and professionals are observed to be of higher awareness on the issue than other groups in society.

2.1. Background factors versus attitude

The influence of socio-demographic characteristics on ICT usage has attracted the attention of researchers during the last two decades. Among these characteristics, gender, age and income have been specially addressed. However, the relevant literature is not conclusive. For example, Meso, Musa, and Mbarika (2005) studied the relationship between gender and technology, and Yang (2005) focused on the gender-based perceptual differences and their effects on using m-commerce. Although they both pointed to the significance of gender, Kalliny and Minor (2006) found no difference between men and women in regard to the use of mobile technologies. Similarly, Crabbe, Standing, Standing, and Karjaluoto (2009) reported conflicting results in terms of the variable income in this respect. This view also applies to age since, for example, the studies by Lee, Cheng, and Cheng (2007) and Zmud (1979) do not agree on the effect of age on using ICT. The former points to the non-significance of age in using m-commerce, whereas the later believes in the influence of age on using new technologies. All these imply that the impact of the above-mentioned factors on the usage of mobile technologies needs further exploration. Experience also appears to be one of the key elements for the level of usage of IT (Jaeger, 2003). Kalliny and Minor (2006) concluded that better educated adults are more likely to use and become familiar with computers and the internet. Additionally, Ngai and Gunasekaran (2007) call for more research on user experience and m-commerce behavioural issues. We defined the experience in two categories as ICT usage experience and professional experience. These

were combined to produce a construct, which is then included as one of the background variables in our study. Seyal and Pijpers (2004) studied the factors influencing executives' attitude and found positive relationships between the type of organisation and ICT usage. In-turn Dadayan and Ferro (2005) present a comprehensive and parsimonious model to understand the similarities and differences (if any) between public and private sectors. Based on their literature survey, they concluded the employees of public-sector agencies have seldom been the unit of analysis.

The attitude towards using a system is defined as 'the degree of evaluative effect that an individual associates with using the target system in his job' (Davis, 1989). A mobile user's individual characteristics are expected to influence the consumer's attitude (Pavlou, Lie, & Dimoka, 2007), and such attitude is differentiated by variability of the users' demographics, shopping motivations, and media dependency (Lee & Lee, 2007; Shuleska, Grishin, & Palamidovska, 2012). The attitude has an intermediary role and is taken as a construct in most of the analysis based on conceptual models. This is also the case in our research (Figure 1).

Against this backdrop we propose the following hypotheses.

$H1_i$: There is a significant relationship between demographic variable *i* (*i*=gender, age, income) and attitude.

$H1_4$: There is a significant relationship between experience and attitude.

$H1_5$: There is a significant relationship between sector and attitude.

2.2. Attitude versus actual use

The attitude and actual behaviour are factors used in many of the conceptual-model-based studies and substantial empirical support exists regarding the causal link between intention and actual use in the adoption of technology. According to Chau and Hu (2002) the attitude plays a significant role in the technology acceptance decisions. Similarly, Dadayan and Ferro (2005) concluded that attitude has a significant impact towards employees' technology acceptance. In a more recent study, Yen, Wu, Cheng, and Huang (2010) found that the attitude in turn led to behavioural intention (BI) to use or accept the technology, and then they generated the actual usage behaviour. However, the significance of this relationship shows different natures depending on the characteristics of the subject and the sample. For example, Pedersen (2005) found no direct effects of behavioural control on actual use, and his conceptual model including the users' attitude explained only 17% of the variance in actual use. The actual use consists of m-services and m-purchase in this study (Figure 1) and, we postulate the following hypotheses.

H2: There is a significant relationship between attitude and actual use of m-commerce.
H3: There is a significant relationship between attitude and actual use of m-services.

3. Research design

A survey approach was adopted for examining the relationship between background factors, attitude, and actual use of mobile commerce and services. A survey instrument corresponding to the proposed hypotheses was developed in the respondent's native language

Table 1. Summary of research questions and constructs.

Question/construct	Definition	Range of values
Sector	What is the sector of your establishment?	Public/private
Gender	What is your gender?	Male/Female
Age	What is your age?	21–30 years, 31–40 years, 41–50 years, >50 years
Income	What is your monthly income?	<1,500YTL, 1,500–3,000YTL, >3,000 TL
Experience (construct)	a) For how many years have you used computer/IT continuously?	a) <5 years, 6–10 years, 11–15 years, >15 years
	b) For how many years are you working professionally?	b) 0–10 years, 11–20 years, 21–30 years, >30 years
Attitude (construct)	a) What are your reasons for using mobile technologies?	a) Cost, medical/welfare, security/reliability, connection quality/service speed, content
	b) What is the approximate cost of mobile operations in your monthly expenditures (in percentages)?	b) <%10, %10–20, %21–30, %31–40, >%40
Actual use (m- commerce)	How much time do you spend on mobile commerce?	Very much, much, average, less, very less
Actual use (m- services)	How much do you use mobile services?	Very much, much, average, less, very less

Source: Compiled by the authors.

(Turkish). A pilot instrument was face validated and revised based on the suggestions from a group of professionals. The survey instrument contains eight items (Table 1). Two of these items are constructs; in other words, experience is a construct from work and IT experiences, and the attitude toward usage is a construct from the reason for usage and the monthly budget allocated to it. The respondents were professionals from public- and private-sector organisations who were the attendees of a one-day seminar organised by a leading international IT company. The participant organisations were selected from the list of major government and private sector organisations using 'judgement sampling' based on the size and the sector of organisations. The invitations were limited to 178 organisations. The respondents participated in the study voluntarily and the data were collected by using a direct (live) survey method. A total of 131 completed survey questionnaires were received at the end of the seminar. Two of these responses were discarded from the analysis due to the existence of unqualified data. Thus, the approximate response rate was 72%, which can be considered acceptable for the purpose of this study (Fleming & Nellis, 2000; Seyal, Rahim, & Rahman, 2000). A summary of the research instrument is given in Table 1.

The regression analysis is a powerful statistical process and widely used for estimating the relationships among variables. It includes many techniques for modelling and analysing several variables, when the focus is on the relationship between a dependent variable and one or more independent variables and allows analysts to establish objective measures, rather than purely using personal judgment. In this study, the regression analysis method (Petre, Minocha, & Roberts, 2006) was selected for testing hypotheses H1–H3 to investigate the nature of the relationship between proposed indicators and factors. The meaning of the regression variables is given in Table 1.

4. Results and discussions

Initially, the results of the survey are presented using descriptive statistics, followed by the results of analysis and discussions.

Table 2. Profile of respondents.

Variable	Number	%
Gender	129	100
Male	89	69
Female	39	30
Unknown	1	1
Age	129	100
21–30	27	21
31–40	47	36
41–50	34	27
>50	21	16
Income (000 TL)	129	100
<2	41	32
2–3	46	36
3–4	30	23
>4	11	9
Unknown	1	1
Sector	129	100
Private	93	72
Public	36	28
m-commerce usage	129	100
Yes	55	43
No	69	53
Unknown	5	4
m-service usage	129	100
Yes	73	57
No	48	37
Unknown	8	6

Source: Authors' calculation.

4.1. Descriptive results

The background profile of respondents is provided in Table 2.

The number of respondents from the government sector was higher (72%) in our survey. Surprisingly, most of the respondents did not use m-commerce (53%) and this figure is the opposite of that for the usage of m-services (57%). The percentages of respondents who used m-commerce from the public and private sectors are 38% and 56%, respectively. These percentages are almost equal (56% and 58%) for m-service users. These may be taken as an indication of the fact that Turkey is a developing country with a promising potential for m-commerce. Interestingly, it was found that the number of males who used m-commerce (41%) is less than that of females (53%). However, m-service-user males (57%) and females (53%) dominate non-user males and females. The respondents were almost uniformly distributed among age groups (21% for 21–30; 36% for 31–40; 27% for 41–50 and 16% for > 50). The income of respondents was accumulated (74%) for income < 3,000 TL (1 TL = 0.45 US$). The IT experience of the respondents was clustered for more than 10 years (56%).

4.2. Test results and discussions

The proposed hypotheses based on the research model were tested individually using the least-squares regression analysis technique, and Minitab statistical software was used for this purpose.

The results are given in Figure 2 along with their perspective path coefficients.

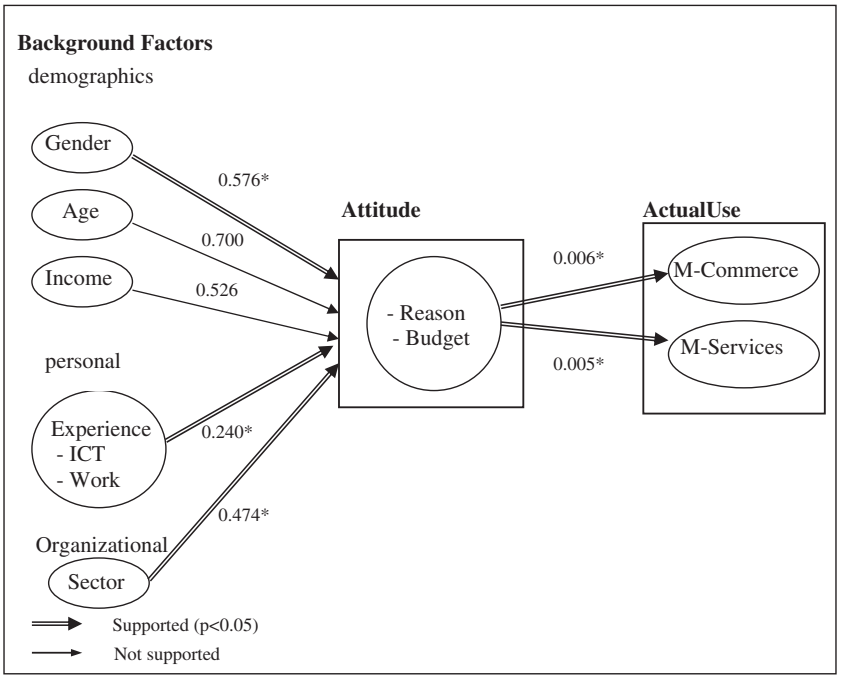

Figure 2. Test results. The numbers over lines represent path coefficients. Double lines represent test-supported hypotheses ($p<0.05$) whereas normal lines represent paths not supported by the test results. Source: authors.

Interestingly, the inspection of *p*-values regarding socio-demographic variables produces conflicting results. In other words, hypothesis $H1_1$ is accepted and, $H1_2$ and $H1_3$ are rejected (Figure 2). This means gender has a significant impact on attitude, whereas this is not applicable to the other demographic characteristics, age and income. In other words, the difference in attitude of m-technology usage can be explained by gender characteristics. In addition, this relation was found to be positive when the path coefficient is considered. Our finding is supported by Bebetsos and Antoniou (2009), who reported gender differences in terms of perceived usefulness in their research among university students. A plausible and interesting explanation may be based on the fact that the traditional dominating role of males in society is not valid in professional life, and that males and females are likely to share opportunities and developments, including ICT, equally. Contradictory findings have also been reported in the literature. For example, Maldifassi and Canessa (2009) found that gender has the least importance when explaining differences in the use of ICT and perception regarding the usefulness of ICT. In another study, Zhang (2005) reported the view that there is no statistically significant difference in terms of ICT subscale usefulness between male and female employees. The most obvious explanation for contradictory results may be based on the differences between the nature of samples and the factors subjected to gender differences.

The current study defines the experience as the construct of number of years of using computers/IT and number of years at work. The hypothesis regarding experience was supported by the test results, and hence, $H1_4$ is accepted (Figure 2). This means, the relationships

between experience and attitude is significant at the 5% significance level, and that it is one of the determinant factors for adopting mobile technologies. Lightner, Yenisey, and Ozok (2002), and Chow and O (2006) are supporters of this result. They pointed to a significant difference between the levels of computer experience for, in particular e-commerce activities. Computer-experienced individuals will know more about how to use ICTs, and this naturally increases with the duration that they spend with ICT technologies (Markus & Soh, 2002). In addition, practical compatibility of the user with a new technology has a positive effect on its adoption (Sait, Al-Tawil, & Hussain, 2004). Furthermore, Peslak (2004) reported variations in the usage of ICT among demographic groups. Therefore, factors such as the amount of long-term usage of ICT may enhance the adoption of mobile technologies (Sait et al., 2004). Additionally, the path coefficient between experience and attitude is observed to be positive (Figure 2). This means that with an increasing level of experience, individuals tend to allocate more budget for adopting m-technologies for most of their daily activities.

Figure 2 indicates that the organisational (sector) factor has a significant impact on attitude, and, therefore $H1_5$ is accepted. In other words, there is a significant difference between public-and private-sector employees in terms of using m-technologies. Figure 2 also shows the path coefficient to be positive, leading to the fact that private sector employees tend to use m-technologies more than their public sector counterparts. Our finding is in line with Frank and Lewis (2004), who reported that some differences exist between public and private sectors in terms of organisational characteristics. This means organisational characteristics and values play an important role in shaping individuals' attitudes towards the use of ICT (Jin, Drozdenko, & Bassett, 2007) Similarly, Levy (2002) reported that individuals' business sector with regard to their opportunities to access information and communication technologies (ICTs) has an important influence on the use of ICTs. All these may be taken as evidence of the notion that the employees' use of ICT and mobile technologies may be shaped according to the sector of their organisations.

The investigation of the relationship between attitude and actual usage has been one of the major concerns in the development of popular conceptual models TRA (Fishbein & Ajzen, 1975) and TAM (Davis, 1989). Our test results indicate that attitude influences the usage of m-commerce and m-services. The literature provides supporting studies on the significance of this relationship. For example, Brereton, Kitchenham, Budgen, Turner, and Khalil (2007) investigated whether the TAM is a reliable predictor of actual use, rather than intention to use, based upon subjective and objective measures. They reported that attitude is capable of providing a reliable prediction of the actual usages of a technology. According to Umarji and Seaman (2005), attitude is a powerful factor for predicting actual usage and acts as the mediating variable.

5. Conclusions

The objective of this study was to evaluate the role of background factors on the attitude and the existence of the impact of attitude on actual use towards the adoption of m-commerce and m-services. A survey approach was adopted for this purpose and Minitab statistical software was used for analysis. The data were collected using a sample of employees from public-sector and private-sector organisations. A predictive conceptual model was created for analyses.

This research has arrived at interesting and concrete inferences regarding adoption of m-technologies such as m-commerce and m-services. According to comparative analysis, amongst the demographic factors, only gender was observed to have a positive effect on the attitude towards adoption of m-commerce and m-services. Interestingly, the positive coefficient found for the relationship between gender and attitude indicated that females use m-technologies more. Surprisingly, age and income do not show any significant influence on attitude in this category. In addition, experience of respondents was also found to have positive influence on the attitude of individuals for actual use of m-services and m-commerce. In other words, experienced people use these technologies more. Interestingly, test results indicated a significant difference between the attitude of employees from public- and private-sector organisations in terms of adopting m-technologies. It can be concluded that private-sector employees use m-technologies more since the coefficient for the relationship between sector and attitude was also found to be positive. Finally, employees' attitude is a significant determinant for the adoption of m-commerce and m-services.

Our results may provide a significant insight for policy makers regarding how to promote mobile commerce and mobile services. We also hope that this study will start a discussion of the implications that will help guide IS practitioners as they develop effective strategies and tactics to penetrate the highly competitive cyber markets. We recognise some limitations in this study. First, for the followers of this paper, we propose to use larger samples, which may lead to more insight into the relationships in the use of m-technologies among employees. Second, an extension to considering the influence of work climates on m-technologies from different sectors may also be interesting. Third, a study considering the size of enterprises from all sectors should be designed to include the usage of m-technologies. Finally, culture is known to affect the use of ICT in the literature, and m-technologies usage among organisations may be studied from an organisational perspective among different countries in the future.

Disclosure statement

No potential conflict of interest was reported by the authors.

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